



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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September 12, 2000

TO: Minerals File

FROM: Anthony A. Gallegos, Senior Reclamation Specialist *aa*

RE: Site Inspection, Kennecott Utah Copper Company (KUCC), Bingham Canyon Mine, M/035/002, Salt Lake County, Utah

Date of Inspection: August 10, 2000

Time of Inspection: 0800 - 1300

Conditions: fair, warm

Participants: Rich Borden, KUCC; Tony Gallegos, Doug Jensen, Tom Munson, Jared Sorensen, DOGM

Purpose of Inspection: To view water control features associated with the mine, and examine the current operations in this portion of the site.

The inspection began with a meeting at the KUCC offices near the visitors center. Rich Borden pointed out some features visible in the mine pit related to the results of some ongoing work characterizing the waste dumps. These features included the different ore zones, seeps, and old stream channels which had been covered by dumps and exposed by mining. In addition to characterizing the materials, KUCC was looking for a correlation between acid generation and tests which are simpler and less costly than the Sobek method.

Samples have been taken from various dumps and analyzed for acid generation potential. Rich displayed geologic maps of the mine showing neutralization potential, acid generation potential, and the acid base accounting analysis. Using the information collected thus far, ABA was plotted against elevation in the pit on the assumption that the characteristics of the waste rock would be similar to the ABA characteristics of the elevation in the pit from which the waste rock originated. Waste rock from high in the pit was typically deposited on the higher dumps to avoid unnecessary haulage. Likewise, waste rock from lower elevations in the pit was typically deposited in lower dumps. The correlation between the ABA of the waste dumps and the elevations in the pits was good. He also displayed plots showing the correlation between

paste conductivity and salinity. The conductivity in the material sampled is largely due to sulfates; therefore, the conductivity may be useful as an indicator of acid generating potential.

The plot of all samples (paste pH versus conductivity) indicates specific boundary conditions are affecting the results. The samples were taken from depths of 0-4 inches. These results raised the question of whether old dump surfaces differ from young dump surfaces. A majority of the pyrite in the samples is very fine grained. Upon exposure, this fine grained material oxidizes very quickly, which would give an initial high acid reading which would then decrease over time. A plot of sample age versus conductivity implied younger dump materials had higher conductivity indicating they have a higher acid generating potential. Dump surfaces which are older are more amenable to revegetation than younger dump surfaces. As examples of this, the higher, east and south dumps are older and have a better pH for plants. The lower, Bingham and Dry Fork dumps have a poor pH for revegetation.

Sampling of the dumps led to the observation that sites with a pH greater than 4.5 tended to have more volunteer revegetation than those sites with a lower pH. Plant species on the dumps have been identified and this information has been used to prepare a seed mix for dump revegetation. Other species which are tolerant to the site conditions have also been added into this mix. Rich mentioned that the information discussed today has been submitted to a professional journal for consideration. The Division may be able to obtain a copy after publication. In addition to generating a professional paper, the information has also been used to prepare a draft guideline for internal review which describes handling procedures for waste materials at the Bingham Mine.

After the meeting we traveled to different parts of the mine site. The first area visited was in the open pit where the upper and lower reaches of the sulfide halo were pointed out, along with the ABA results for the different geologic layers. Several shovels and haul truck fleets (CAT 793) were operating in the pit at this time. Waste rock is currently being dumped into Bingham Canyon dump as recently proposed. A majority of the future mine waste will be placed in this dump.

We next visited the dump area west of the Olsen-Queen(?) Dump. The dump here has very good vegetation cover and diversity from natural invasion. As a side note, KUCC has experienced both good and bad results from using composted biosolids. Biosolids from some treatment facilities have introduced specific weeds onto the site. The weeds may have been in the biosolids as windblown seeds in the compost stockpiles, or by the biosolids failing to undergo sufficient composting to sterilize any seeds. To avoid importing more weedy species, KUCC may resort to composting the materials on site.

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We next visited the Yosemite Dump where it leads into Butterfield Canyon. This dump has a high salinity. From here we next visited the water plant. Mr. Helmar Bayer described the reverse osmosis (RO) and nanofiltration processes being tested at this demonstration plant. After this we visited the Midas 7100 dump and returned to the KUCC offices for lunch and a wrap-up discussion.

Since the main purpose of this inspection was to collect information, no significant decisions were arrived at, although, the Division encourages KUCC to continue characterizing the waste dump and pit wall materials. It may also be useful to sample and test the seeps within the pit for use in developing a pit model for consideration of various pit closure scenarios.

jb
cc: Rich Borden, KUCC
Wayne Hedberg, DOGM (route)
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M/035/002
8/10/00 INSPECTION

